TWG June 6-8, 1999
Attachment 8B

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Subject: FY2001 Budget Response
Cc:
Bcc:

Attached are materials that will be discussed at the TWG meeting.

Introduction, FY2001:

Attached are the responses to questions raised by Cliff, Bill, and others regarding the FY 2001 budget request. Please remember that according the budget protocols the TWG developed, at this stage in the budget process we are trying to settle on a gross number to recommend to the AMWG for support with the subsequent details to be worked out so that a final budget and work plan can be sent to the AMWG at their January 2000 meeting. I hope the attached materials will provide you the information required to help promote a productive discussion at the upcoming TWG meeting. Some of the questions raised by Cliff regarding the use of Section 8 funds to support some of the biological program activities are outside GCMRC's area of control but are certainly things we can discuss at the TWG with all present. Finally, a number of the questions relate to the issue of when the protocol evaluation process will be completed and how the proposed work relates to long-term monitoring. Please remember that in the revised GCMRC strategic plan, which was put on hold following the December 8, 1999, meeting, there was a plan for getting each resource through a PEP process and having all resources under a long-term monitoring program by FY 2002. The work proposed here is viewed by GCMRC as the logical next steps in this process. For some, I know the issue of budget creep looms large. We do not see major increases for the base program beyond what is proposed here. However, since we have not completed the protocol evaluation process for all resources, we are hesitant at this time to say the FY 2001 budget represents a firm budget for the next 5 years. Although, with the exception of unanticipated research questions or event driven scientific activities, we feel we are approaching a firm budget.

FY 2001 PROGRAM AREA BUDGET PROJECTIONS AND JUSTIFICATIONS

VI. C. PHYSICAL RESOURCES SCIENCE

The following FY 2001 physical science activities are intended to: 1) initiate key elements of a long-term monitoring program for physical resources of the Colorado River ecosystem [draft monitoring plan in progress] related to management objectives described in the *Final Operations of Glen Canyon Dam EIS*, plus additional objectives and information needs identified by the Glen Canyon Dam Adaptive Management Workgroup; and 2) develop predictive modeling capabilities of system-wide sediment transport and streamflow related to dam operations under the current operating criteria, and related ecosystem responses. Both the long-term monitoring information and the new research elements are intended to build on existing experimental knowledge and historical synthesis of geomorphic information as part of an overall long-term monitoring and research program designed to support adaptive ecosystem management. Long-term monitoring of sediment, flow and related geomorphic processes is intended to occur in strategically planned increments of five years. The goal of long-term monitoring is to provide consistent and timely information on physical resources of concern to stakeholders with respect to impacts of dam operations under the Record-of-Decision (ROD).

← poster (A&B)

Modeling research and development (1- and 2-dimensional hydrodynamic flow and sediment, and aquatic ecosystem relationships with coarse-sediment budget and processes) of the mainstem channel responses to operations below Glen Canyon Dam is specifically intended to increase predictive capabilities of managers with respect to sediment transport as related to management objectives. Such system-wide predictive capabilities support all current physical resource management objectives, such as conservation of sand resources and preservation of fine-sediment related habitats. Once verified and calibrated, such models are valuable in helping to facilitate recommendations on the effectiveness of the Secretary's actions (ROD) with regard to geomorphic processes and attributes of the ecosystem, such as sand bars, backwaters and debris-fan/eddy complexes. Sediment and flow modeling also allows for alternative operational scenarios to be evaluated by managers when trying to make recommendations on how ROD actions might be altered to improve their overall effectiveness.

NOTE:*(All of the following FY 2001 monitoring and research activities will be procured through a competitive RFP process. Costs will be determined through open competition, plus project support supplied through GCMRC for logistics and survey data collection.)*

I. MONITORING SEDIMENT, STREAMFLOW AND GEOMORPHIC/HABITAT-RELATED FEATURES -2001:

prioritized 1

A) ***Streamflow and Sediment Monitoring of Main Channel Colorado River and Gaged Tributaries*** – approximately $475,000, relating hourly to annual dam operations to daily to seasonal impacts on the system-wide fine-sediment budget

of the ecosystem. These monitoring data also support basic research efforts related to sediment transport and geomorphology, as well as development of mainstem and tributary modeling predictive capabilities. This effort represents a continuation of the base monitoring program, plus addition of a daily suspended-sediment sampling schedule at the Grand Canyon gage (river mile 87) for measurement of fine-sediment export from critical upstream reaches.

B) ***Monitoring of Terrestrial Shoreline Sandbars within Critical Reaches*** – approximately $150,000, relating ROD dam operations to annual and event (BHBF, etc.) driven responses in sand bars used as campsites, backwater habitats, terrestrial vegetation substrates within critical reaches and system-wide. This effort represents a continuation of the base monitoring program for terrestrial and sub-aqeuous channel-stored sand.

C) ***Monitoring of Gaged Tributary Channel Characteristics for LCR and Paria Rivers Flow and Sediment Modeling Verification*** - approximately $15,000, to provide ongoing information on tributary channel responses related to predictive sediment/flow model parameters that are required to ensure that model outputs remain calibrated. This effort supports use of flow and sediment modeling as an ongoing monitoring tool for the major fine-sediment contributing tributaries gaged below Glen Canyon Dam.

D) ***Change Detection for Debris Fans, Cobble Bars and Rapids*** – approximately $30,000, to document annual impacts to the Colorado River ecosystem that occur from tributary debris flows in combination with dam operations, including BHBFs. Such change detection data will add to information on long-term impacts of tributary debris flows with respect to navigational conditions of rapids, impacts to sand bars and influence of aggrading channel features on the aquatic ecosystem. This effort is part of the base monitoring program for physical resources and geomorphic changes that occur to the ecosystem caused by ungaged tributary debris flows.

E) ***Selected Sediment and Flow Instrumentation of Key Ungaged Tributaries in Glen and Upper Marble Canyon*** – approximately $30,000, to verify long-term fine-sediment projected inputs to critical reaches within 75 miles downstream of the dam. Also, to evaluate the timing of large ungaged sand inputs relative to historical timing or Paria and Little Colorado River inputs. This effort represents a new baseline monitoring effort to better estimate fine-sediment inputs from ungaged tributaries that contribute to the sediment budget of critical upstream reaches.

TOTAL MONITORING COSTS = $700,000

II. NEW RESEARCH OF SEDIMENT, STREAMFLOW AND GEOMORPHIC/HABITAT-RELATED FEATURES: – 2001

NOTE: *(The following three research efforts described below are prioritized in terms of perceived program area information and predictive capability needs of the adaptive management program.)*

A) ***Reach-Averaged Hydrodynamic Flow and Sediment Modeling of Sandbar Evolution within Critical Reaches of Glen and Marble Canyons.*** Unlike sandbar modeling that has previously occurred within the context of developing the Conceptual Model, this modeling research project will attempt to predict eddy/sandbar and channel-margin evolution under a variety of ROD scenarios, including BHBF and HMF implementation; flows identified in the ROD as potentially capable of restoring and preserving critical backwater habitats, campable areas, pre-dam river terraces and the terrestrial substrates where riparian vegetation exists. Recent experimental results (1996 BHBF and 1997 HMF, experiments) have indicated that flow magnitude/duration beyond those described in the ROD may be required to restore and preserve backwater habitats. Additional 2-dimensional flow and sediment modeling will help identify what discharge from the dam and mainstem sediment concentration conditions will be required to achieve the BHBF and HMF objectives stated in the final EIS.

Reach-averaged eddy/sandbar modeling responses determined throughout the critical upstream reaches will provide "process-response" inputs for use in development of a predictive fine-sediment transport model for the mainstem channel (see below). Channel geometry developed to achieve these reach-averaged model results will also provide the input data for developing more accurate reach-averaged hydraulic geometry for 1-dimensional sand, silt/clay transport in conjunction with the existing unsteady flow model for routing discharges from Glen Canyon Dam. Need for reach-averaged predictive capabilities related to debris-fan/eddy complex sandbar evolution is based on management objectives, and results of the conceptual ecosystem model development and review panel workshops conducted by GCMRC in FY 1998, and 1999.

This will be the first of likely a two-year effort, with an estimated first-year start-up cost of $50,000. Final costs for completion of this effort are anticipated to be $100,000. Additional costs for GCMRC to provide needed high-resolution channel geometry data will be covered through survey support services provided to the potential contractor. This research will be competitively procured through an RFP, to be released in spring 2000. The actual final costs are estimated on the basis of similar modeling efforts that have been conducted previously within the study area by the Water Resources Division of the U.S. Geological Survey. Final costs will be determined through a competitive process.

B) ***Research and Development of 1-Dimensional Fine-Sediment and Streamflow Model for the Main Channel of the Colorado River between Glen Canyon Dam and Upper Lake Mead.*** This geomorphic-process based modeling effort will focus on accurately predicting downstream impacts of Glen Canyon Dam

operations on multiple size-classes of sand, and silt/clay from inputs at the Paria and Little Colorado River past the Grand Canyon gage (export from "critical" reaches), using the existing *1-Dimensional Unsteady Flow Model* [developed by the GCES in cooperation with the USGS during the Glen Canyon Dam EIS period].

This will be the first of likely a three-year effort, with a cost ceiling for first-year start-up of $150,000. Total costs for model development are anticipated to be $400,000 over the course of the three-year model development period. This research would be competitively procured through an RFP, to be released in spring 2000. The actual final costs are not easily estimated at this time, as similar work has not been conducted previously within the study area. Final costs will be determined through a competitive process. Need for a 1-dimensional predictive capability for fine-sediment transport related to the system-wide sediment budget is based on management objectives, and results of the conceptual ecosystem model development and review panel workshops conducted by GCMRC in FY 1998, and 1999.

C) ***Initiate Integrated Research to Define and Model Relationships between the Coarse Sediment Budget of the Colorado River Ecosystem and its Aquatic Ecosystem.*** This physically based ecosystem modeling effort will investigate the linkages between tributary and dam-operation driven geomorphic processes that structure the geomorphic framework of the Colorado River ecosystem, the relationships of those processes to the system's aquatic ecosystem, and long-term implications of ROD operations at Glen Canyon Dam.

Need for better understanding related to the system-wide coarse-sediment budget and impacts on the aquatic ecosystem under current dam operations is based on management objectives and results of the conceptual ecosystem model development and the Protocols Evaluation Panel [PEP – SEDS], for physical resources monitoring workshops conducted by GCMRC in FY 1998 and 1999, [see *Interim Report on SEDS*, fall 1998]. Additional justification for this type of integrated research on ecosystem function and relationship to physical resources comes from previous National Academy of Sciences review reports on the GCES program that called for better integrated understanding of interdisciplinary science and resource area interactions. This research will support future long-term monitoring program decisions designed to facilitate linkages between physical and biological ecosystem processes.

This will be the first of likely a two-year research effort, with an estimated first-year start-up cost of $50,000. This research would be competitively procured through an RFP, to be released in spring 2000. The actual final costs are not easily estimated at this time, as similar work has not been conducted previously within the study area. Final costs will be determined through a competitive process.

BEST-ESTIMATE FOR TOTAL RESEARCH COSTS = ~$250,000

TOTAL ESTIMATED PHYSICAL SCIENCE COSTS IN FY 2001 = ~$950,000

Response to 2001 Budget comments regarding budget increases and baseline monitoring program for Biology

The budget request for biology for 2001 represents existing budget values approved for FY2000 and increased funds associated with proposed management actions. The additional requested funds represent money that would be spent to study effects of an action. Just as additional funds are needed to study events such as a Beach Habitat Building Flow, these requested funds would be used to study the effects of either of these proposed actions. The duration (not specified in this proposed budget) of the additional funding needs reflects the response time of the resource and the need to collect data prior to, during and after an action. Monitoring programs are designed to collect trends in a long-term sense (1, 5 or perhaps 10 year change), while event drive data collection efforts are designed around specific research questions and require more intensive effort over a shorter period of time.

The development of long-term monitoring includes review of previous efforts, synthesis of information to provide a state of knowledge of the system, protocol review (PEP) to determine the methods that best collect data for the long-term program, and implementation. Baseline monitoring programs associated with dam operations for the biological resources are being developed with some resource areas farther along than others with regard to these steps. Their development is reflected in the budgeting/planning provided in the attached table (table 1). In the meantime, transition monitoring is continuing. The data collection efforts currently underway and funded for FY2000 are intended to become integrated into any long-term monitoring program that subsequently is put into place. The notion that the current data collection efforts do not constitute elements of baseline data should be disregarded.

Regarding the additional funding request for proposed actions, the timing of both of these proposed actions is potentially eminent (within the next 1 to 3 years). While baseline monitoring is being developed and data are being collected, additional data collection efforts associated with these events also need to be put into place. Science plans for both of these actions need and are in various stages of development. An outline for the TCD science plan development is provided in this response. Additionally, a project for the development and implementation of experimental flows is funded that will provide an outline for these flows. These requested funds represent an estimate for these plans and may increase or decrease depending on the outcome of the science plan development and review.

GCMRC does not have Section 8 funds directly available for use. Additionally these actions are associated with adaptive management and should be supported by the adaptive management process. In the spirit of adaptive management, any management actions should provide information about resource response. If data are not collected in a manner that provides information, then the actions can only be noted that they took place.

The success or failure of an action cannot be understood and perhaps modified if there is not adequate data collected around an event.

FY 2000	Overall Prgm dates	Aquatic F base	Trout	Native fish	avifauna	KAS/swwf	vegetation	H2O Qual Pgm
Oct-99	Activity/budget	contracts extended	contracts extended	contracts extended	contracts extended			LTM in place
Nov-99								
Dec-99								
Jan-00								
Feb-00	final budget							
Mar-00								
Apr-00								
May-00								
Jun-00								
Jul-00	RFP FY2000			research rfp			RFP	
Aug-00								
Sep-00								
Oct-00	Review RFP's							PEP
Nov-00	Award Fy 2000 RFP							
Dec-00	final budget FY2001					PEP KAS		

FY 2001	Overall Prgm dates	Aquatic F base	Trout	Native fish	avifauna	KAS/swwf	vegetation	H2O Qual Pgm
Oct-00	Proposed budget	Continued Contract		Continued Contract	Competitve	in house experime	PEP	LTM in place
Nov-00							review of results	
Dec-00	Final Budget 2001							
Jan-01								
Feb-01								
Mar-01			PEP/Trout Symp					
Apr-01					PEP Avifaun		PEP Veg	
May-01	RFP FY 2001 - 06		LT Monitoring RFP		LT Monitoring RF	LT Mon RFP ?	LT Monitoring RFP	
Jun-01								
Jul-01								
Aug-01	Review							
Sep-01								
Oct-01	Award FFY 2001		AWARD LTM (5yrs)		AWARD LTM (5yrs)		AWARD LTM (5yrs)	
Nov-01		PEPdownstream mon		PEP aquatic food base				
Dec-01								

FY 2002	Overall Prgm dates	Aquatic F base	Trout	Native fish	avifauna	KAS/swwf	vegetation	H2O Qual Pgm
Oct	Proposed budget 2002	Continued Contract	LTM in place	Continued Contract	LTM in place	In house ?/LTM in	LTM in plac	LTM in place
Nov								
Dec	Final Budget 2002							
Jan								
Feb								
Mar								
Apr								
May	RFP FY 2002 - 06	LT Monitoring RFP		LT Monitoring RFP				
Jun								
Jul								
Aug	Review							
Sep								
Oct	Award FFY 2002	AWARD LTM (5yrs)		AWARD LTM (5yrs)				
Nov								
Dec								

FY 2002	Overall Prgm dates	Aquatic F base	Trout	Native fish	avifauna	KAS/swwf	vegetation	
Oct	Proposed budget 2003	LTM in place	LTM in place	LTM in place	LTM in place	LTM in place	LTM in pla	LTM in place
Nov								
Dec	Final Budget 2003							
Jan								
Feb								
Mar								
Apr								
May	RFP FY 2003	research as $$ avai	research as $$ ava	research as $$ av	research as $$	research as $$ a	research as	research as $$ available
Jun								
Jul								
Aug	Review							
Sep								
Oct	Award FFY 2003							
Nov								
Dec								

FY 2002	Competitve	Continued Contract
Oct	award for ltm	LTM btes
Nov		
Dec		
Jan		
Feb		
Mar		
Apr		
May		
Jun		
Jul		
Aug		
Sep		
Oct		LTM btesafbnfveg
Nov		

PEP

Dec

Socio-Cultural Resources Program
FY 2001 Budget Response

In response to recent questions, the following information is provided for the base program and requested FY2001 budget increases.

A. Cultural Resources: Archaeological and Traditional Tribal Resources

The base program activities in the cultural resources area focus on resource conservation and the implementation of activities that meet the Information Needs that have been ranked with the highest priority. The top priority Information Needs address monitoring of cultural sites to assess impacts that are related to dam operations and identifying specific management/ research needs to assist in site conservation, including preservation, stabilization, documentation, etc. If conservation of resources is not possible, acquisition and dissemination of data about the resources, including scientific and other sources of information such as tribal information, received the second highest priority.

Based on the priorities identified and approved by the AMWG in July 1998, base program activities for these resources consist of a combination of monitoring and research activities to identify types of impacts, rates of loss, and possible protection measures. On-going monitoring activities that support assessments of impacts to resources include collection of photos from stationary cameras directed at terraces containing cultural materials in the Glen Canyon reach, Hopi Tribal ethnobotanical monitoring, and data dissemination of previously collected ethnobotanical monitoring information by the Southern Paiute Consortium. The monitoring activities are expected to continue into FY 2001.

Continuing research activities include studies that model sediment deposition at varying flow regimes and test a geomorphic hypothesis concerning the relationship between dam operations and the erosion of sediments containing cultural materials. It is anticipated that these research projects will provide additional information on the geomorphic and hydrologic processes that affect cultural site conservation. These research project results will be available in FY 2000 and will be provided to the PA Program to assist in the monitoring activities that are currently occurring under that program. Project results may be useful in focusing monitoring efforts at sites that are most threatened and for monitoring the utility of specific mitigation efforts. A synthesis project compiling and synthesizing previously collected data will be available at the end of FY 1999. This report will provide information to formulate future monitoring and research projects.

A protocol evaluation of this program and the PA Program is scheduled in FY 2000. This evaluation will provide useful information for tailoring base program activities and methodologies at GCMRC and in the PA Program.

FY 2001 Budget Increase Requests

A budget increase of $ 50,000 is requested for this component of the program. The increase provides additional funding for the protocol evaluation efforts in assessing project effectiveness. The funding amount identified in the FY 2000 work plan of $15,000 and the FY2001 requested increase of approximately $ 20,000, result in total funding for protocol evaluation of $ 35,000 in FY 2001. The remaining funding increase of $ 30,000 will be allocated to additional geomorphic studies that may be required to answer outstanding questions related to the current geomorphic study. FY2000 funding for continued application of geomorphic hypothesis testing is $ 35,000 resulting in total funding for this effort of $ 65,000 in FY 2001. Additional funding is requested in these two area as a result of comments expressed at the February 1999, TWG meeting. Based on comments at the meeting these projects seem to be roughly equal in priority.

B. Recreational Resources

The base recreational program addresses issues of recreational experience, camping beaches, and fishing issues that are identified in the priority Information Needs. The FY 2000 work plan includes projects that monitor beach changes through quantitative and qualitative means (NAU beach studies and Adopt-a-Beach program). Additional work includes protocol assessments of campsite monitoring and collection of anglers' survey and sport fishing data relative to recreational satisfaction. The final project will synthesize existing information on campsite changes during the last 30 years. The total funding for the recreational component in FY 2000 is $ 55,000 and is primarily monitoring and protocol activities. All of these activities are anticipated to continue into FY 2001. A current research project that identifies recreational preferences will conclude early in FY 2000. This project should provide important information relative to recreational preferences, especially for campsites and beaches.

FY 2001 Budget Increases

A budget increase of $ 20,000 is requested for FY 2001. The increase would be used for unanticipated information requests that have not been budgeted in this area, and additional work for recreational fishing assessments. Unanticipated information requests are estimated at about $ 5,000 for FY 2001. Recreational fishing assessments would be funded at about $ 5,000 (FY2000 level) plus about $ 15,000 in FY 2001 for a total funding of approximately $ 20,000. It is anticipated that initial protocol assessments of recreational fishing data in FY 2000 will suggest areas to be addressed in FY 2001.